If you are using a printed copy of this procedure, and not the on-screen version, then you MUST make sure the dates at the bottom of the printed copy and the on-screen version match.
The on-screen version of the Collider-Accelerator Department Procedure is the Official Version.
Hard copies of all signed, official, C-A Operating Procedures are kept on file in the C-A ESHQ Training Office, Bldg. 911A.

C-A OPERATIONS PROCEDURES MANUAL

ATTACHMENT

2.28.d Work Screening Guidance

Text Pages 2 through 9

C-A OPM Procedures in which this Attachment is used.		
2.28		

Hand Processed Changes

HPC No.	Date	Page Nos.	Initials

Approved: _____***Signature on File***_____ _____
Collider-Accelerator Department Chairman Date

E. Lessard, P. Cirnigliaro

2.28.d Work Screening Guidance

The following criteria should be considered when reviewing a job for hazard classification and to identify the precautions needed:

Location - A routine job in an administrative building would be low hazard, whereas a similar job in a High Radiation Area will require more planning and controls.

Environmental Conditions – Environmental conditions are required to be assessed in planning work and determining hazard ratings. Moisture, humidity, lighting or temperature, may affect how the job is performed. Wet, icy walking, or work surfaces that may be affected. Terrain of the work area is to be considered in the evaluation. Sloped work surfaces, hard slippery surfaces, or uneven surfaces may cause injury.

Equipment - Equipment under configuration management control, such as primary shielding or parts of the Access Controls System, or equipment classified as A1 or A2 will drive higher levels of control. Refer to the Screening Guide Lines located at BNL SBMS "Work Planning and Control for Experiments and Operation."

Removing Damaged Equipment from Service - If any equipment presents an immediate hazard that could reasonably be expected to cause serious injury or environmental harm, then you must remove it from service (e.g., broken ladders, frayed slings, defective power cords, leaking tanks).

Permits and Similar Administrative Controls – RWPs, Working Hot, Confined Space, Cutting and Welding, Fire System Impairment, Critical Lifts, and Orange Tags, ECNs associated with power distribution, are associated with moderate to high hazard jobs.

Work Instructions - If work instructions are needed to reduce the complexity or hazards involved, he hazard classification is higher.

Potential for serious injury - Refer to the Screening Guide Lines located at BNL SBMS "Work Planning and Control for Experiments and Operation."

Potential for high dollar loss due to equipment damage or system outage - Refer to the Screening Guide Lines located at BNL SBMS "Work Planning and Control for Experiments and Operation.".

Potential for high dollar loss due to Valuable Material Security – Refer to C-A-OPM 1.20 "C-A Policy for Valuable Materials Security."

Potential for release of hazardous or radioactive materials - Refer to the Screening Guide Lines located at BNL SBMS "Work Planning and Control for Experiments and Operation."

Pollution Prevention – Consider Waste Management and Pollution Prevention in the planning of the job. Refer to BNL SBMS "Pollution Prevention and Waste Minimization".

Standard for work Planning - Refer to:
Refer BNL SBMS "Work Planning and Control for Experiments and Operation."

Staffing Levels – Do not assign work if you are short handed and the work requires more people. Do not violate safety rules to get the job done. For example, do not plan work to go down one way streets the wrong way, even though you get to the job site quicker. Do not climb cable trays because it takes more time to get a man lift. Do not use untrained personnel. In short, there are no economics for safety. It will always be cheaper to do the job correctly the first time. There is only a cost for failure, and experience shows that this cost can be spectacular.

Procedures – Perform the work planning according to the requirements in C-A procedures, or cause those requirements to be officially changed to what the C-A Department really needs. This policy applies to all C-A Groups and will be enforced everywhere. Work Control Coordinators and workers will be held accountable to follow rules and procedures for which they have been trained.

Stop Work Authority – C-A management encourages all C-A personnel to identify environmental, safety or health (ESH) problems, and to suggest improvements. If any condition or practice presents an immediate hazard that could reasonably be expected to cause serious injury or environmental harm, then you must stop work until effective corrective action is taken. Refer to BNL SBMS "Stop Work – Imminent Danger Procedures."

The procedure for reporting ESH concerns is to bring them to the attention of your supervisor immediately. If you feel issues are not being addressed, then report it directly to the C-A Department Chair.

If work is stopped as an imminent hazard, it may not be restarted without the authorization of the C-A Department Chair, or his designee (C-A ESHQ Associate Chair, C-A ESHQ Division Head). Examples of imminent hazards include but are not limited to:

- Work in confined spaces without following confined space entry requirements
- Work on elevated areas without fall protection
- Work in an excavation zone deeper than 5 feet without shoring
- Working hot on electrical systems without proper working-hot controls
- Heat source near combustible material
- Work which may result in uncontrolled release of toxic, radioactive or flammable liquids
- Failure to comply with radiation control or security barrier
- Lockout/Tagout violations
- Unsecured cylinders or unsecured heavy equipment on moving vehicle
- Unprotected work around Class III and Class IV Lasers

Refer to:BNL SBMS "Stop - Work Imminent Danger Procedures".

Accountability for Not Following the Rules - Perform exactly the requirements in C-A procedures or cause those requirements to be officially changed to what the C-A Department really needs. This policy applies to all C-A Groups and will be enforced everywhere. You will be held accountable for willful violation of rules and procedures for which you have been trained.

PARTIAL LISTING FOR GUIDANCE
TO DETERMINE LOW, MODERATE,AND HIGH RISK LEVELS

Low Hazard

- Routine preventive maintenance.
- Simple LOTO (not involving multiple energy sources)
- Work covered under general RWP
- Filtered respiratory protection used on the basis of personal choice
- Routine crane, bucket-truck, or fork-truck work by trained personnel
- Routine carpentry work, e.g., hanging s bulletin boards, erect office partitions, painting, etc.
- Routine mechanical work, e.g., run air lines, realign coupling, repack valve, etc.
- Re-lamping
- Restroom repairs
- Scaffold assembly/disassembly (inspection required)
- Routine HVAC repair
- Work on energized systems under 50 volts (Range A)

Moderate Hazard

- Respiratory protection (SCBA is High Hazard)
- Work requiring a job specific RWP
- Confined space work (Class 2A and 2B)
- Bucket truck work within 10 feet of a non-insulated, energized line
- Asbestos abatement work
- Work requiring fall protection
- If work permit is required for outside department
- ALARA review required (greater than 0.75 person-rem)
- Radiation Safety Committee review required
- Need to set up Radioactive Material Work Area
- X-ray hazards or sources in use
- Conventional Safety Committee review required
- Cutting and welding in other than C-A pre-established areas
- Fire Hazard involved
- Hazardous/flammable gas hazard created
- Personal Protective Equipment (PPE) required, other than safety glasses, gloves shoes, ear plugs, or hard hat
- Liquid spill prevention required
- Liquid or airborne effluents generated
- Excavations
- Use of any hoisting and rigging equipment in excess of 75% of the rated capacity
- Access control issue
- Minors or students or untrained person involved in work

- Operational safety limits required
- Shut down procedures required
- HEPA vacuum cleaners required
- Sweep procedure required
- Crane clearance problem
- Exposed energized conductors
- Radioactive waste will be generated
- Fire protection system impairment
- Third party LOTO removal required
- Tank storage or secondary containment issues
- Emergency procedures required
- Solid hazardous waste will be generated
- Significant (tons) non-hazardous waste generated
- Removing cable bundles during decommissioning, disconnected cables left in place are to be labeled and terminated
- Work on energized systems with voltages greater than 50 volts but less than volts (Range B and C)
- Work involving Power Distribution requiring ECN's
- Lead storage shed work
- Work on an open RHIC ring with nitrogen purge venting to tunnel (potential for oxygen to drift below 19.5%).
- Work involving tritiated water.
- Work involving mercury.
- Storage of materials with intrinsic or scrap value exceeding $1,000.00.
- Uneven/unsure walking/work surfaces.
- Environmental conditions, i.e. moisture, humidity, lighting, temperature, ice, snow, mud, terrain that may cause injury through slips, trips, falls, or difficulty in performing work safely.

<u>High Hazard</u>

- Confined space work requiring permit (Class 2C)
- Work in High Radiation Areas greater than 5 rem/hour
- Work in High Contamination Areas
- Work involving voltages greater than 600 volts (Range D) (ESH Standard 1.5.0)
- Work requiring the disabling or jumpering-out of safety interlocks (ESH Standard 1.5.3)
- Work on pressure or vacuum vessels with greater than 500 psi-cubic-feet for the product of pressure and volume
- Excavations over 5 feet in depth where personnel will be working in a trench
- Critical lifts
- Moving ALARA shielding (blocks and steel)
- Class IIIb and IV laser alignment activities, which potentially expose personnel to laser hazards.

OTHER C-A CONTROLS TO CONSIDER WHEN PLANNING WORK

TABLE 2 LISTING OF FORMAL C-A WORK CONTROLS
OPERATIONS / ADMINISTRATION
Accelerator Studies - Division Head must authorize dedicated studies, OC must authorize all other studies (OPM 2.11)
Control Rooms - supervisor must have procedures for access, control of trainees, and operator aides in control room under his/her purview (OPM 2.3)
Minors - supervisor must notify ES&H Coordinator prior to allowing a minor to work near hazards (OPM 1.13) & (OPM 2.16)
Operating Practice - OC must give authorization to operate equipment that impacts accelerator (OPM 2.2)
Operating Procedures - supervisor in charge must ensure shift-operations have operating procedures (e.g., Conduct of Operations OPM Chapter 2)
Operational Safety Limits – supervisors must follow prescribed limits; they are specific to certain supervisors/OCs (OPM 2.5)
Shutdown Of Experimental Areas - OC officially declares beam off, CAS supervisor initiates shutdown checklist (OPM 5.29)
Shutdown Of Linac, Booster And AGS Ring - OC ensures RS LOTO of machines and primary beam-lines (OPM 5.29)
Students – supervisors must ensure untrained students receive no more than 25 mrem in one year. Supervisors must contact the C-A ESHQ Division Head prior to assigning work to a student at C-A (OPM 2.16)
Turnover Of Beam-lines to Experimenters - CAS supervisors complete checklist, OC must authorize (OPM 8.10.2)
Users – Experiment Spokespersons are responsible to ensure Users have C-A User Training prior to the startup of each running period.
Work Permit for Outside Department – supervisor / designated caller must ensure work permit is used when outside Department is called upon to perform work at C-A (OPM 1.11)

RADIATION
ALARA - supervisor must review plans, procedures, equipment and the work area to ensure radiation exposures are ALARA (OPM ATT 9.5.1.b)
ALARA Design Review - supervisor must ensure new component receives ALARA design review if installation and maintenance dose may exceed 0.75 person-rem (OPM 9.5.2)
ALARA Job Review - supervisor must ensure job receives ALARA review if dose is greater than 0.75 person-rem
C-A-OPM 2.16 "Procedure to Escort Personnel in C-A Primary Areas, Controlled Areas, Radiological Areas, and ODH Areas" - escorts for tours or work performed by escorted personnel must be approval by Operation Coordinator, C-A ESHQ Associate Chair, C-A ESHQ Division Head – OPM 2.16.
C-A Procedure for Access to Contamination and High Radiation Areas OPM 9.5.11
HEPA Vacuum Cleaners - supervisor must provide annual inventory of HEPA vacuum cleaners to ES&H Coordinator if used for radioactive materials (OPM 9.5.9)
Radiation Safety Review - if in charge of a new project, new experiment, or involved in a shielding removal, or if you are altering the beam-line running condition, then supervisor/project leader must ensure that a review for radiation safety occurs prior to start (OPM 9.1.1, OPM 9.1.2, OPM 9.1.12)
Radiation Work Permits - supervisor must initiate Radiation Work Permit for dispersible radioactivity work, and for collective dose greater than 100 person-mrem or dose rate greater than 1000 mrem/hour (OPM 9.5.4)
Radioactive Work - supervisor is responsible for properly setting up Radioactive Material Work Areas (see FS Representative).
Sweep Procedures for Secondary Areas – Collider-Accelerator Support (CAS) supervisor trains Watch, Radiation Control Division (RCD) Supervisor trains Radiological Control Technician (RCT) (OPM 4.49)
X-ray Hazards - supervisor must ensure written procedures are used when operating any device that has a potential to produce x-rays (e.g., OPM 8.23.1)

CONVENTIONAL HAZARDS
Confined Space – Permit required (OPM 8.14)
Conventional Safety Review - if in charge of project or experiment or running condition, then supervisor must ensure a review for conventional safety occurs prior to start (OPM 9.2.1, OPM 9.2.4, OPM 9.3.1)
Crane Clearance - CAS supervisors must control crane use in experimental areas (OPM 8.12.1)
Cutting and Welding – Cutting and welding with open flame requires a BNL Cutting and Welding Permit (ESH Standard 4.3.0)
DNOT Tags - supervisor authorizes a DNOT tag if used longer than one shift (OPM 2.13)
Electrical Safety - supervisor inspects energized equipment every 2 years (OPM 1.5)
Experimental Beam-line Readiness -CAS supervisors must complete checklist and authorize beam-line operation (OPM 8.12.4)
Fire Safety - supervisor must inform Fire Capt. and ES&H Coordinator where flammable atmospheres are located (OPM 1.9)
Fire Protection System Impairment – placing fire protection systems out of service requires a permit (ESH Standard 4.2.0)
Hazard Communication - supervisor prepares annual hazard check list (OPM 1.8)
Hazardous Gas In Experimental Areas - CAS supervisors must complete checklist and authorize operation (OPM 8.12.2, 8.12.3)
Work on lasers – must be in accordance with standard operating procedure (SOP) and work plan (Laser Safety)
LOTO Removal - supervisor signs when using Three-man Rule (OPM 2.14)
Maintenance - supervisor must inform Maintenance Coordinator of all intended work during shutdown periods and provide summary when completed (OPM 2.10)
Maintenance Procedures - supervisor must prepare predictive and preventive maintenance procedures for equipment under their purview (OPM 2.10)
Material Handling (Fork-trucks, Hoists, Cranes, Shackles, Slings) - supervisor must ensure staff is trained, inspections are scheduled, equipment is inspected and corrective actions are logged (OPM 8.25)
Mechanical Safety - supervisor must inspect work areas every month and log it with Chief Mechanical Engineer (OPM 1.6)
Personnel Protective Equipment (PPE) - supervisor consults with ESHQ Division on use of PPE for each task.
Safety Inspections - supervisor must participate in safety inspections with C-A Safety Inspection Committee and close violation notices within designated time (OPM 9.4.1)
Tank Storage and Secondary Containment – for hazardous materials, supervisor must ensure 80-gallon-rule for single vessel and 250-gallon-rule for all vessels in building are followed (OPM 1.14)

Working Hot – working on energized electrical systems in Ranges B, C or D requires a working hot permit. (ESH Standard 1.5.0)
EXIGENT SITUATIONS
Emergency Procedures - supervisor must supply list of all potentially hazardous or flammable chemicals in work areas to Local Emergency Coordinator (LEC) (OPM 3.2)
Emergency Response - if LEC not present, then the CAS Watch Supervisor is the LEC (OPM 3.2)
Occurrence Reporting - OC or supervisor must report potential emergency, unusual or off-normal event to next higher level of supervision (OPM 10.1)
Smoke in Primary Areas - supervisor or OC ensures checklist is initiated when fire or smoke occurs in primary or activation areas (OPM ATT 10.1.e)
Trouble Reporting - supervisor must ensure operators are initiating Trouble Reports when required (OPM 2.9)
Water Spills - supervisor or OC must ensure checklist is initiated for water spill greater than 100 gallons (OPM ATT 10.1.d)
WASTE STREAMS
Hazardous Waste - supervisor must ensure that hazardous waste generators are trained and that satellite areas are locked, lids closed, containers labeled, and area is close to point of generation (OPM 8.20)
Hazardous Waste Trailer – supervisor must ensure that only trained generators transfer waste to 90-Day area (OPM 8.20.1)
Liquid and Airborne Effluents - supervisor must obtain BNL ES Division permission prior to release of any effluent (OPM 1.15)
Non-Hazardous Waste - supervisors must ensure waste streams are minimized and recyclable products are used where possible (OPM 8.22)
Radioactive Waste - supervisors must ensure handlers are properly trained, all waste is checked for activation prior to disposal, and BNL Fire Group is notified of location of any rad-waste area (OPM 8.20.2)
TRAINING
Training - supervisor must ensure group members and all sub-contractors are properly trained (OPM 1.12)
Untrained Personnel - supervisor must ensure designated escorts are used to escort the untrained in primary areas, Controlled Areas, High Radiation Areas, and ODH Designated Areas. (OPM 2.16)